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EXAMINER	
GHULAMALI, QUTBUDDIN	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
10/17/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com
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Office Action Summary	Application No.	Applicant(s)
	10/723,215	POLLEY ET AL.
	Examiner	Art Unit
	Qutub Ghulamali	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 July 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13-22,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-22,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

DETAILED ACTION

1. This Office Action is in response to the amendment/remarks filed 07/25/2007.

2. Applicant's amendment correcting informalities with claims 1, 2 and 18 is acknowledged and accepted.

Response to Remarks

3. Applicant's amendment/remarks (see page 10), filed 07/25/2007, with respect to the rejection of claims 9-11, 17, 23-24 under 35 U.S.C. 102(b), has been fully considered, however, they do not place the application in condition for allowance. The previous indication of allowable subject matter in claims 1-8, 18-22, 12-16 and 25-26 has been withdrawn in view of further review and search. The rejection follows.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 13, 14, 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 13 recites the limitation "the weighting vector" in line 8-9. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 13 recites the limitation "the amount of power" in line 10. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 14 recites the limitation "the communication quality" in line 2. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 15 recites the limitation "the number of data transmissions" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-8, 13-22, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raleigh et al (USP 6,144,711) in view of Akaiwa et al (USP 5,710,995).

Regarding claims 1, 20, Raleigh discloses a wireless communication system comprising:

a plurality of antennas through which the wireless device communicates with a second wireless device, each antenna of the plurality of antennas communicates with the

second wireless device via an associated communication pathway (col. 2, lines 1-15; col. 11, lines 42-67). Raleigh, however, does not explicitly disclose,

sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis; and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine a weighting vector for an associated antenna based on the highest communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna.

However, Akaiwa in a similar field of endeavor discloses sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis (col. 3, lines 45-55);

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine a weighting vector for an associated antenna based on the highest communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna (col. 1, lines 53-64; col. 4, lines 22-50). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize a sub channel power analysis and a diversity selection logic circuit as taught by Akaiwa in the system of Raleigh because with the use sub

channel power analysis distortion resulting from multipath transmission can be mitigated to arrive at optimized quality of the received signal and diversity selection to allow best possible antenna signal selection of power and quality.

Regarding claim 2, Raleigh discloses representing the weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (col. 5, lines 35-67; col. 6, lines 42-67).

Regarding claim 7, Raleigh discloses wireless device wirelessly communicate with a plurality of wireless stations (see fig. 6).

Regarding claim 8, Raleigh discloses all limitations of the claim above. Raleigh does not explicitly disclose a signal selection circuit (splitter) coupled to diversity logic to reproduce signals to be transmitted. However, Akaiwa, discloses signal selection circuit (splitter) coupled to diversity logic to reproduce signals to be transmitted (col. 4, lines 18-44). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use selection circuit (splitter) coupled to diversity logic as taught by Akaiwa in the system of Raleigh because it can allow signals to be reproduced for transmission more effectively.

Regarding claims 13, 3, 20, Raleigh discloses a method comprising:
Receiving data from a first wireless devices to a second wireless devices using a plurality of antennas (fig. 4-5, elements 55) a plurality of antennas through which the wireless device communicates with a second wireless device, each antenna of the

plurality of antennas communicates with the second wireless device via an associated communication pathway (155a-f) (col. 2, lines 1-15; col. 11, lines 42-67);

for each communication pathway, combining a transmission signal with the weighting vector to form a weighted transmission signal (col. 6, lines 42-40; col. 8, lines 40-48); and

transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (col. 6, lines 42-50; col. 7, lines 35-39); sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis (col. 3, lines 45-55). Raleigh does not explicitly disclose weighting vector in a ratio format and ratio format specifies an amount of power to be applied to an antenna associated with the weighting vector for each subchannel. The examiner takes the position that values or vector weights can be represented in as a ratio and is well known in the art. As per an amount of power to be applied to an antenna associated with the weighting vector for each subchannel, Akaiwa, however, discloses an amount of power to be applied to an antenna associated with the weighting vector for each subchannel (col. 3, lines 45-55). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to specify an amount of power to be applied to an antenna associated with weight vectors as taught by Akaiwa in the system of Raleigh because

with the use of amount of power to be applied in a ration form can optimize quality of the received signal and antenna signal selection of power and quality.

Regarding claim 14, Raleigh discloses all limitations of the claim above, except does not explicitly disclose the amount of power to be applied to an antenna is based on the communication quality of each subchannel. However, Akaiwa discloses the amount of power to be applied to an antenna is based on the communication quality of each subchannel (col. 3, lines 10-62). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to specify an amount of power to be applied to an antenna associated with weight vectors as taught by Akaiwa in the system of Raleigh because with the use of amount of power to be applied in a ration form can optimize quality of the received signal and antenna signal selection of power and quality.

As to claim 17, Raleigh discloses various sub-channels are characterized by the signal-to-noise ratio (col. 18, lines 8-25).

Regarding claim 18, Raleigh discloses a system comprising:

an access point (a node or a connection for receiving and transmitting signals such as an antenna) having a plurality of antennas (fig. 6, element 55);

a wireless station in communication with the access point via a single antenna in the wireless station (col. 2, lines 1-15), wherein the plurality of antennas in the access point receive a data signal from the single antenna in the wireless station via a plurality of communication pathways (col. 7, lines 35-40), each communication pathway comprising a plurality of sub-channels ; wherein the access point determines channel

characteristics and a weighting vector for each antenna of the plurality of antennas (col. 8, lines 40-50, 55-63); wherein the access point reproduces (creates) a data transmission signal (col. 8, lines 55-58), combines each copy of the data transmission signal with a different weighting vector to produce a weighted transmission signal for transmission (col. 8, lines 41-46). Raleigh, however does not explicitly disclose each weighting vector being indicative of an amount of power to be provided to each sub-channel for an associated antenna. However, Akaiwa in a similar field of endeavor discloses use of sub-channel power analysis logic adapted to determine a weighting vector for an associated antenna based on the highest communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna (col. 1, lines 53-64; col. 4, lines 22-50). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to utilize a sub channel power analysis logic circuit as taught by Akaiwa in the system of Raleigh because with the use sub channel power analysis, distortion resulting from multipath transmission can be mitigated to allow optimized quality of the received signal and diversity selection for best possible antenna signal selection of power and quality.

Regarding claim 19, the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or subchannels each byte of data to be transmitted for transmission concurrently or simultaneously on different frequencies

over sub-channels of a wide frequency spectrum, is well known in the art of communication (col. 5, lines 35-67; col. 6, lines 42-67).

Regarding claim 21, Raleigh discloses amount of power to be provided to antennas for various sub-channels are characterized by the signal-to-noise ratio for that antenna (col. 18, lines 8-25). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality was last determined. Akaiwa in a similar field of endeavor discloses plurality of antennas coupled to a switch 43 to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality was last determined (col. 1, lines 53-63; col. 3, lines 44-62; col. 4, lines 15-65). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas as taught by Akaiwa in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multipath in transmission of broadcast signals.

Regarding claim 22, Raleigh discloses amount of power to be provided to antennas for various sub-channels are characterized by the signal-to-noise ratio for that antenna (col. 18, lines 8-25). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed since the communication quality was

last determined. Akaiwa in a similar field of endeavor discloses plurality of antennas coupled to a switch 43 to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed (col. 3, lines 30-40) since the communication quality was last determined (col. 1, lines 53-63; col. 3, lines 44-62; col. 4, lines 15-65). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select a plurality of antennas and providing power to each antenna of the plurality of antennas based on time elapsed as taught by Akaiwa in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multipath in transmission of broadcast signals.

Regarding claim 25, 4, 5, 15, Raleigh discloses a method comprising: for each of a plurality of antennas, determining communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels (a "sub-channel" is a combination of a bin in a substantially orthogonalizing procedure (SOP)) (col. 1, lines 31-59; col. 2, lines 1-15);
for each sub-channel, selecting at least one antenna (selects at least one spatial direction associated with an antenna, see fig. 24) for data transmission based on the communication quality of said antenna (col. 26, lines 49-52; col. 27, lines 45-55); and concurrently transmitting data via the plurality of antennas across the plurality of sub-channels (col. 27, lines 64-67). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality

was last determined. Akaiwa in a similar field of endeavor discloses plurality of antennas coupled to a switch 43 to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality was last determined (col. 1, lines 53-63; col. 3, lines 44-62; col. 4, lines 15-65). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas as taught by Akaiwa in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multipath in transmission of broadcast signals.

Regarding claim 26, 6, Raleigh discloses a method comprising: for each of a plurality of antennas, determining communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels (a "sub-channel" is a combination of a bin in a substantially orthogonalizing procedure (SOP)) (col. 1, lines 31-59; col. 2, lines 1-15);
for each sub-channel, selecting at least one antenna (selects at least one spatial direction associated with an antenna, see fig. 24) for data transmission based on the communication quality of said antenna (col. 26, lines 49-52; col. 27, lines 45-55); and concurrently transmitting data via the plurality of antennas across the plurality of sub-channels (col. 27, lines 64-67). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed since the communication quality was

last determined. Akaiwa in a similar field of endeavor discloses plurality of antennas coupled to a switch 43 to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed (col. 3, lines 30-40) since the communication quality was last determined (col. 1, lines 53-63; col. 3, lines 44-62; col. 4, lines 15-65). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select a plurality of antennas and providing power to each antenna of the plurality of antennas based on time elapsed as taught by Akaiwa in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multipath in transmission of broadcast signals.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Raleigh et al (USP 6,144,711).

Regarding claim 9, Raleigh discloses, transmitting data from a first wireless device to a second wireless device using a plurality of antennas, wherein each antenna communicates with the second wireless device via an associated communication pathway (col. 2, lines 1-15);

determining a plurality of channel characteristics (within Channel ID block 130, the characteristics of the digital communication channel are estimated, the estimated channel values consist of entries in a matrix for each SOP bin, the matrix contains complex values representing the magnitude of the spatial channel within the SOP bin from one transmit antenna element to one receive antenna element, the transmitted information among the various sub-channels available for transmission are determined based upon the measured communication quality of the space frequency information that carries the symbol stream) associated with each of the plurality of antennas (col. 8, lines 1-9; col. 5, lines 61-67; col. 6, lines 1-5);

on a per sub-channel basis, computing a weighting vector for each antenna of the plurality of antennas based on the channel characteristics (channel state information within each SOP bin) (col. 2, lines 1-15; col. 6, lines 42-67; col. 8, lines 40-58);

representing the weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (Note: the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or subchannels each byte of data to be transmitted for transmission concurrently or simultaneously on different frequencies over sub-channels of a wide frequency spectrum, is well known in the art of communication) (col. 5, lines 35-67; col. 6, lines 42-67);

for each communication pathway, combining a transmission signal with the weighting vector to form a weighted transmission signal (col. 6, lines 42-40; col. 8, lines 40-48); and

transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (col. 6, lines 42-50; col. 7, lines 35-39).

Regarding claim 10, Raleigh discloses data transmission from one wireless device to a plurality of devices and receives data from a plurality of wireless devices (col. 2, lines 1-8).

As per claim 11, Raleigh discloses each weighting vector specifies a relative transmission power for each sub-channel (col. 8, lines 63-67).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutub Ghulamali whose telephone number is (571) 272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QG.
October 10, 2007.

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER